

### Complications in Trauma: (General - Local - Recumbency)

شغل دماغك وانت بتحل واختار الحاجات المناسبة للكسر ، يعني ميقاش كسر بسيط أو peripheral وتبدأ بالـ Shock أو الـ DIC

#### A) General: (usually of major trauma)

- 1-Shock      2-DIC      3-Fat Embolism & ARDS      4-DVT & PE
- 5-General Infections      6-Crush Syndrome      7- Increased metabolism & muscle wasting
- 8-Complications of Recumbency

#### 1- Shock:

-State of decreased tissue perfusion. If persists irreversible damage to life supporting organs can occur

-↓ Perfusion → Hypoxia, Acidosis, Release of inflammatory mediators & Cell damage

- Endothelial cell damage → fluid leakage & more reduction in tissue perfusion

#### -Types of shock:

**a-Neurogenic Shock:** due to emotional (e.g. vasovagal attack) or painful injuries or both. Blood Volume is Unchanged but its distribution from Vital to non-vital organs

الدم بيسيب الـ vital organs زي الـ Brain والـ Heart ويروح لأماكن Less Significant زي الـ Splanchnic والـ Muscles

**b-Hypovolemic shock:** due to ↓ in blood volume by bleeding (external/Internal). Distribution of blood occur in the opposite direction of that of neurogenic shock

-Secondly, Compensatory sympathetic mechanisms maintain COP

- كل ما كان المصاب في حالة بدنية أحسن Fit كل ما قدرت الـ Compensatory mechanisms تحافظ على الـ BP فترة أطول ،

علشان كده متنخدعش لما يجيلك شاب عنده Fracture Pelvis وتقيس الضغط تلاقيه منزلش كثير ، لازم Blood Transfusion

- If these mechanisms are overwhelmed, peripheral vessels are dilated and BP drops.

- Closed fractures bleed **MORE** than appreciated (F. femur → 1-1.5 L – F. pelvis → up to 3 L)

**-C/P: 1- Patient is pale, thirsty, drowsy & confused (confused d.t. ↓ brain tissue perfusion)**

- العيان ده بيخرف أو بينادي على ناس مش موجودة ، والناس بتتريق عليه وهو المفروض يأخذ نقل دم بسرعة علشان هو ييموت

2- Breathing is shallow & rapid, Extremities feel cold and clammy

3- Pulse ↑ while BP and urinary function and output ↓

**-TTT: 1- ttt of the cause      2-Stop pain, fear & bleeding**

3-Replace blood volume by crystalloid (e.g Ringer's) (till blood is available) by rapid rate 100 ml/min

4- Resuscitation and Oxygen

#### 2- DIC (Disseminated Intravascular Coagulopathy)

- A complex mixture of **IV coagulation** with **depleting clotting factors and platelets**

- Due to endothelial damage, release of tissue thromboplastins & platelets activation

- **C/P:** Microvascular thrombosis leads to skin & organ infarcts and renal failure

- **TTT:** 1-Prevention      2-Replace clotting factors & platelets in severe shock

#### 3- Fat Embolism & ARDS (Acquired Respiratory Distress Syndrome):

- Fat globules from bone marrow → Lung → extreme edema of the alveoli → Hypoxia & inflammation

→extravasation of protein rich fluid → Lung fibrosis → Severe hypoxemia and death

- تأخذ بالك من الـ fat embolism بالذات لما يكون العظم اللي اتكسر قريب من blood vessel ويكون معاه في نفس الوقت

Lung trauma زي حالة الـ Fracture Femur في السواقين (Dashboard Injury)

#### 4- DVT (Deep venous Thrombosis) & PE (Pulmonary Embolism):

- DVT is the commonest complication, most frequent in Calf Vein
- **Causes: (Virchow's Triad):**
  - \***Hypercoagulability:** d.t activation of factor X by thromboplastin released from damaged tissues
  - \***Stasis:** from bandages, compression from edema, recumbence and immobilization (calf is the 2<sup>nd</sup> heart)
  - \***Endothelial damage**
- **C/P:** a- **DVT:** -Usually occult -Pain in the Calf increases by dorsiflexion (**Homans' sign**)  
-Swelling, Tenderness and increase in temperature & pulse
- b- **PE:** -Chest pain, dyspnea & hemoptysis (7-10 days)
- c- **Postphlebitic Syndrome** (months after): Chronic Lower limb edema and Leg ulcers
- **TTT:** \*Prophylaxis: 1-Physical calf exercise, Leg elevation, elastic stocking & early mobilization  
2- Anticoagulant in high risk group 3-Proximal DVT → immediate bed rest & anticoagulant 4-PE→ ICU

#### 5- Infection (General):

##### A) Gas Gangrene:

- Clostridial anaerobic infection, occurs in tissues with low O<sub>2</sub>, Usually dirty wounds with dead muscles  
→ Toxins produced destroy cell wall & lead to more myonecrosis
- C/P:** within 24 h: -intense pain & swelling with brownish discharge that has charactersitic Smell  
\*Gas formation is usually not marked (seen only in X-ray)
- Prevention:** High risk wounds should be explored, dead muscles excised (Life Before Limb)  
\*If in doubt wound should be left open
- TTT:** -Fluids, Antibiotics and Hyperbaric Oxygen  
- Immediate wound exploration & removal of dead tissues & if required AMPUTATION

##### B) Tetanus:

- Exotoxins → AHCs → Paralysis \* If reaches respiratory muscles → Asphyxia
- **C/P:** Jaw & Face contraction (Trismus and Risus Sardonius)
- **Prevention:** -Immunization - Wound Toilet (Debridement غسيل الجرح)
- **TTT:** -IV antitoxin -Muscle relaxation -Intubation if reaches resp. muscles)

#### 6- Crush Syndrome: (في الإنهيارات)

- If large bulk of muscle is crushed, then the compression is released → Acid myohematin from muscle breakdown → is carried to the kidneys blocking tubules and causing the renal spasm → renal failure
- **TTT:** -Reduce fluid and protein intake -↓ Protein catabolism (Neomycin - CHO) -Renal support (dialysis)

#### 7- Catabolic State and Muscle Wasting:

- To **counteract** Acute effects of: \* Tissue damage \*Blood Loss \*Inflammatory response \*Tissue repair
- Energy required for these vital mechanisms are secured at the expense of less dependent muscles
- Stress (of mechanisms) activates hypothalamic pituitary adrenal axis → ↑ACTH, Catecholamines  
→ Increase Glycogenolysis
- So within 24 h: **Increase in:** 1-Metabolic rate 2-Body temperature 3-O<sub>2</sub> Uptake 4-Blood Sugar
- Loss of Amino acids needed by liver and protein required for inflammatory response → Muscle wasting

#### 8- Complications of Recumbency:

- 1- **Skin:** Bed Sores (d.t. ischemia at pressure points → Infections) العيان لازم يتقلب كل ساعتين
- 2- **Respiratory:** Pneumonia 3- **GIT:** Constipation 4-**GUS:** Stones 5- **CVS:** DVT
- 6- **Psychological:** Depression (even suicide)
- 7- **CNS:** Nerve palsy (Foot Drop فيحصله Common peroneak nerve على العيان اللي نايم على جنبه بيضغط على)
- 8- **Muscles:** wasting 9- **Bones:** Porosis 10- **Joints:** Stiffness

- ميتكتبش غير في العيان اللي ممكن يحصل فيه Recumbency زي Polytrauma, F. Pelvis, F. Femur, F. Spine

## **B) Local Examination:**

	<b>Early</b>	<b>Late</b>
<b>Bones</b>	Infections	Healing problems: -Mal union -Delayed union (>6m) -Non union (>9m)
<b>Joints</b>	Hemoarthrosis	Stiffness
<b>Ligaments</b>	Instability	Deformity
<b>Vascular</b>	Acute Ischemia & Gangrene Compartment syndrome	Muscle wasting and Atrophy Volkmann's ischemia
<b>Nerves</b>	Partial or Complete Tear	
<b>Muscles</b>	Rupture of the tendon	Attrition      Myositis Ossificans
<b>Skin</b>	Wound infections if open fracture    -Ecchymosis and blisters if closed	
<b>Associated</b>	Can cause damage to visceral organs e.g. Brain, kidneys, intestine or bladder	
<b>Growth plate</b>	If injured in child → Growth arrest	

### **\*\*Compartment Syndrome:**

- ↑ BP inside the muscular compartment > 30 mmHg → Stop of Capillary circulation in this compartment
- Caused by pressure on capillaries by hematoma, fractured bone or edema
- If persist more than 6 hours → Death of muscles & Contracture → permanent deformity
- It's an emergency and requires immediate surgical treatment.
- This case is diagnosed by (Pain Out of Proportion)
- Failure to relieve the pressure can result in necrosis of tissue in that compartment → Volkmann's contracture in affected limbs